

HIGBY et al.

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Continuation of Appln. Serial No. 08/472,189

Preliminary Amendment

**Claims 13-47 are added as new claims.**

*A<sup>2</sup>* 13. A neutral gray colored glass composition having a base glass portion comprising:

<i>Su 53</i>	$\text{SiO}_2$	65 to 80 percent by weight
	$\text{Na}_2\text{O}$	10 to 20 percent by weight
	$\text{CaO}$	5 to 15 percent by weight
	$\text{MgO}$	0 to 10 percent by weight
	$\text{Al}_2\text{O}_3$	0 to 5 percent by weight
	$\text{K}_2\text{O}$	0 to 5 percent by weight

and a colorant portion consisting essentially of:

$\text{Fe}_2\text{O}_3$ (total iron)	0.30 to 0.70 percent by weight
$\text{FeO}$	up to 0.16 percent by weight
$\text{Co}_3\text{O}_4$	3 to 25 PPM
Se	0.5 to 10 PPM

wherein the color of the glass is characterized by a dominant wavelength less than 560 nanometers, a color purity of no higher than 6 percent and a visible light transmission of 70 percent or greater at a thickness of 4 millimeters.

*2* 14. The composition as in claim 13 wherein the direct solar heat transmission is at least 12 percentage points below the visible light transmission.

*Su 53* 15. The composition as in claim 14 wherein the  $\text{Fe}_2\text{O}_3$  concentration is from 0.45 to 0.65 weight percent, the  $\text{FeO}$  concentration is from 0.08 to 0.16 weight percent, the  $\text{Co}_3\text{O}_4$  concentration is from 8 to 20 PPM and the Se concentration is from 1 to 5 PPM

*4* 16. The composition of claim 13 wherein the color of the glass is characterized by

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a dominant wavelength in the range of 494 to 560 nanometers and a color purity of no higher than 3%.

17. The composition as in claim 13 further including additional ultraviolet absorbing material.

18. The composition as in claim 17 wherein said ultraviolet absorbing material is titanium dioxide present in an amount up to 1.5 wt. % of the glass composition.

19. The composition as in claim 18 wherein said  $TiO_2$  present is in an amount from 0.33 to 1.0 wt. %.

20. A glass sheet made from the composition as recited in claim 15.

21. The glass sheet as in claim 20 wherein the sheet has a thickness between 1.7 to 5 mm.

22. The glass sheet as in claim 20 wherein the color of the glass is characterized by a dominant wavelength in the range of 494 to 560 nanometers and a color purity of no higher than 3%.

23. A neutral gray colored glass composition having a base glass portion comprising:

$SiO_2$	65 to 80 percent by weight
$Na_2O$	10 to 20 percent by weight
$CaO$	5 to 15 percent by weight
$MgO$	0 to 10 percent by weight
$Al_2O_3$	0 to 5 percent by weight
$K_2O$	0 to 5 percent by weight

and a colorant portion consisting essentially of:

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Fe <sub>2</sub> O <sub>3</sub> (total iron)	0.30 to 0.70 percent by weight
FeO	up to 0.16 by weight
Co <sub>3</sub> O <sub>4</sub>	3 to 25 PPM
Se	0.5 to 10 PPM
NiO	up to 50 PPM

wherein the color of the glass is characterized by a dominant wavelength in the range of less than 560 nanometers, a color purity of no higher than 6 percent and a visible light transmission of 70 percent or greater at a thickness of 4 millimeters.

11 10  
24. The composition as in claim 23 wherein the direct solar heat transmission is at least 12 percentage points below the visible light transmission.

11 25. The composition as in claim 23 wherein the Fe<sub>2</sub>O<sub>3</sub> concentration is from 0.45 to 0.65 weight percent, the FeO concentration is from 0.08 to 0.16 weight percent, the Co<sub>3</sub>O<sub>4</sub> concentration is from 22 to 27 PPM, and the Se concentration is from 1 to 5 PPM.

11 13 26. The composition of claim 24 wherein the color of the glass is characterized by A dominant wavelength in the range of 494 to 560 nanometers and a color purity of no higher than 3%.

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14 27. The composition as in claim 23 further including additional ultraviolet absorbing material.

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28. The composition as in claim 27 wherein said ultraviolet absorbing material is titanium dioxide present in an amount up to 1.5 wt. % of the glass composition.

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29. The composition as in claim 28 wherein said TiO<sub>2</sub> is present in an amount from 0.33 to 1.0 wt. %.

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30. A glass sheet made from the composition as recited in claim 23.

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31. The glass sheet as in claim 30 wherein the sheet has a thickness between 1.7 to 5 mm.

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32. The glass sheet as in claim 30 wherein the color of the glass is characterized by a dominant wavelength in the range of 494 to 560 nanometers and a color purity of no higher than 3%.

33.

A neutral gray colored glass composition having a base glass portion comprising:

SiO <sub>2</sub>	65 to 80 percent by weight
Na <sub>2</sub> O	10 to 20 percent by weight
CaO	5 to 15 percent by weight
MgO	0 to 10 percent by weight
Al <sub>2</sub> O <sub>3</sub>	0 to 5 percent by weight
K <sub>2</sub> O	0 to 5 percent by weight

and a colorant portion consisting essentially of:

Fe <sub>2</sub> O <sub>3</sub> (total iron)	0.45 to 0.70 percent by weight
FeO	up to 0.16 percent by weight
Co <sub>3</sub> O <sub>4</sub>	3 to 25 PPM
Se	0.5 to 10 PPM

wherein the color of the glass is characterized by a dominant wavelength less than 560 nanometers, a color purity of no higher than about 8 percent, a visible light transmission of greater than 70 percent, and a direct solar heat transmission at least 12 percentage points below the visible light transmission at a thickness of 4 millimeters.

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The composition of claim 23 wherein the color of the glass is characterized by a dominant wavelength in the range of 494 to 560 nanometers and a color purity of no higher than 3% at a thickness of 4 millimeters.

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The composition as in claim 33 further including additional ultraviolet absorbing material.

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A glass sheet made from the composition as recited in claim 33.

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37.

A neutral gray colored glass composition having a base glass portion comprising:

$\text{SiO}_2$	65 to 80 percent by weight
$\text{Na}_2\text{O}$	10 to 20 percent by weight
$\text{CaO}$	5 to 15 percent by weight
$\text{MgO}$	0 to 10 percent by weight
$\text{Al}_2\text{O}_3$	0 to 5 percent by weight
$\text{K}_2\text{O}$	0 to 5 percent by weight

and a colorant portion consisting essentially of:

$\text{Fe}_2\text{O}_3$ (total iron)	0.45 to 0.70 percent by weight
$\text{FeO}$	up to 0.16 percent by weight
$\text{Co}_3\text{O}_4$	3 to 25 PPM
Se	0.5 to 10 PPM

wherein the color of the glass is characterized by a dominant wavelength less than 560 nanometers, a color purity of no higher than 6 percent and a visible light transmission of greater than 70 percent at a thickness of 4 millimeters.

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The composition as in claim 37 wherein the color of the glass is characterized by a dominant wavelength in the range of 494 to 560 nanometers and a color purity of no higher than 3 percent at a thickness of 4 millimeters.

39.

A neutral gray colored glass composition having a base glass portion comprising:

<i>SiO<sub>2</sub></i>	65 to 80 percent by weight
<i>Na<sub>2</sub>O</i>	10 to 20 percent by weight
<i>CaO</i>	5 to 15 percent by weight
<i>MgO</i>	0 to 10 percent by weight
<i>Al<sub>2</sub>O<sub>3</sub></i>	0 to 5 percent by weight
<i>K<sub>2</sub>O</i>	0 to 5 percent by weight

and a colorant portion consisting essentially of:

<i>Fe<sub>2</sub>O<sub>3</sub></i> (total iron)	greater than 0.45 up to 0.65 percent by weight
<i>FeO</i>	up to 0.16 percent by weight
<i>Co<sub>3</sub>O<sub>4</sub></i>	3 to 25 PPM
<i>Se</i>	0.5 to 10 PPM
<i>NiO</i>	up to 50 PPM

wherein the glass has a visible light transmission luminous transmittance of greater than 70 percent at a thickness of 4.0 millimeters.

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The composition as in claim 39 wherein the color of the glass is characterized by a dominant wavelength in the range of 494 to 560 nanometers and a color purity of no higher than 6 percent at a thickness of 4.0 millimeters.

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*28* *26*  
41. The composition of claim *39* wherein the color of the glass is characterized by a dominant wavelength in the range of 494 to 560 nanometers and a color purity of no higher than 3% at a thickness of 4.0 millimeters.

*29* *26*  
42. The composition as in claim *39* wherein the  $\text{Fe}_2\text{O}_3$  concentration is from 0.51 to 0.61 weight percent.

*30* *26*  
43. The composition as in claim *39* wherein the direct solar heat transmission is at least 12 percentage points below the visible light transmission.

*31* *26*  
44. The composition as in claim *39* further including additional ultraviolet absorbing material.

*32* *26*  
45. A glass sheet made from the composition as recited in claim *39*.

*33* *26*  
46. The composition as in claim *39* wherein the  $\text{Fe}_2\text{O}_3$  concentration is from 0.51 to 0.61 weight percent, the  $\text{FeO}$  concentration is up to 0.14 weight percent, the  $\text{Co}_3\text{O}_4$  concentration is from 5 to 24 PPM, the Se concentration is from 1 to 9 PPM and the  $\text{NiO}$  concentration is 15 to 31 PPM and further wherein said composition has a visible light transmission of 70 percent or greater at a thickness of 4 millimeters.

*34* *26*  
47. The composition as in claim *39* wherein the  $\text{Fe}_2\text{O}_3$  concentration is from 0.51 to 0.61 weight percent, the  $\text{FeO}$  concentration is up to 0.14 weight percent, the  $\text{Co}_3\text{O}_4$  concentration is from 5 to 24 PPM and the Se concentration is from 1 to 9 PPM.